REMARKS

Claims 1-17 are pending in this application. By this Amendment, claims 1, 4 and 8 are amended; and claim 17 is added. Support for the amendments and new claim can be found, for example, in the specification (see specification, p. 9, lines 14-15). No new matter is added.

Applicants appreciate the courtesies shown to Applicants' representative by Examiner Bryant in the November 17, 2009 personal interview. Applicants' separate record of the substance of the interview is incorporated into the following remarks.

In view of the foregoing amendments and the following remarks, reconsideration and allowance are respectfully requested.

I. Rejection Under 35 U.S.C. §102

The Office Action rejects claims 1-4, 8, and 9 under 35 U.S.C. §102(b) under French Publication No. 2 150 608 to Coron ("Coron"). Applicants respectfully traverse the rejection.

The Office Action asserts that Coron discloses ferrites and iron oxides acting as a "dilute resistive medium" and asserts that because: (a) plasma frequency is dependent upon the temperature of the material; and (b) the rate of time in which free carriers are relieved is related to a material's resistance, the infrared (IR) radiation absorbed by the sensing element creates a change in temperature, thereby affecting its resistance (Office Action, pages 2-3). However, for at least the reasons presented below, Applicants submit that Coron does not disclose and, thus, fails to anticipate, each and every feature of claims 1, 4 and 8.

First, Coron merely discloses: (a) a bolometer having doped silicon or germanium crystal as a sensitive element; and (b) that ferrite and iron oxide compounds may have the ability to absorb infrared radiation or convert infrared radiation into heat, as a "dilute resistive medium" (Coron, p. 1, lines 6-8 and 20-22). However, Coron fails to disclose the spinel ferrite structure of a sensitive element as recited in claims 1, 4 and 8.

Second, as discussed during the interview, rather than disclosing a spinel ferrite structure of a sensitive element, Coron instead describes iron oxide and ferrite materials as "dilute resistive mediums," expressly defined by Coron as having a "plasma frequency less than the reciprocal of the free carrier relaxation time constant" (Coron, p. 2, lines 5-8). This term, "dilute resistive medium", refers to optical properties of a material, not sensitive material behavior in a bolometer.

In more general terms, materials have the ability to allow or not to allow the propagation of an electromagnetic wave through their bulk. All materials contain electronic charges and, thus, they respond, in varying degrees, to the application of an electric field. Therefore, identifying materials with different permittivities can enable the design of devices with different electromagnetic functionality (e.g. different levels of reflection, transmission, and absorption) over various regions of the electromagnetic spectrum.

With this background in mind, Coron merely discloses that in order for materials to have low reflectivity and good absorption through the far infrared, the materials must have high permeability and electrical conductivity adjusted to the maximum wavelength at which the bolometer device of Coron is to be used (Coron, p. 2, lines 1-4). Thus, ferrites and iron oxides are suitable to be incorporated into Coron's bolometer, not because of sensitivity material properties, but because ferrites and iron oxides have suitable electrical conductibity and permittivities as a "dilute resistive medium" with optical properties such as plasma frequency, etc., as disclosed in Coron (Coron, p. 2, lines 5-8; *see also* Baktry, Assem, "*Dispersion and Fundamental Absorption Edge Analysis of Doped a-Si:H thin Films I : p-type*", Egypt. J. Solids, Vol. (31), No. (2), (2008) for a detailed discussion of plasma frequency, free carrier concentration, relaxation time, and other optical parameters related to the term "dilute resistive medium").

Based on the above, rather than disclosing ferrites and iron oxides as a sensitive element in a bolometric device, Coron discloses use of ferrites and iron oxides for use as a dilute resistive medium, on the basis of their optical properties and their ability to absorb infrared radiation or convert infrared radiation into heat.

It is well settled that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently, in a single prior art reference. *See* MPEP §2131. Based on the above, Coron fails to disclose: (1) a bolometric device, the device comprising, *inter alia*, at least one sensor provided with a sensitive element, wherein the sensitive element has a spinel ferrite structure, as recited in claim 4; and (2) a method of bolometric detection, detecting infrared radiation or of producing infrared imaging using a bolometric device, wherein the bolometric device comprises at least one sensor provided with a sensitive element having a spinel ferrite structure, as recited in claims 1 and 8. Instead, Coron merely discloses a bolometric device using doped silicon or germanium crystal as a sensitive element, and ferrites and iron oxides incorporated for their optical properties with respect to the wavelength at which the bolometer of Coron is used (Coron, pages 1-2).

For at least these reasons, Coron fails to disclose each and every feature of claims 1, 4, and 8, and, thus, does not anticipate claims 1, 4 and 8. The remaining claims variously depend from claims 1, 4 or 8 and, thus, are also not anticipated by Coron.

Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

II. <u>Rejections Under 35 U.S.C. §103</u>

The Office Action rejects claims 6, 7, 13, and 15 under 35 U.S.C. §103(a) over Coron in view of U.S. Patent No. 6,359,276 to Tu ("Tu"); rejects claim 5 under 35 U.S.C. §103(a) over Coron in view of U.S. Patent No. 5,962,854 to Endo ("Endo"); and rejects claims 10 and 11 under 35 U.S.C. §103(a) over Coron in view of Endo and Tu. Applicants respectfully

traverse the rejections. The above discussion with respect to Coron in relation to the rejection under §102 is incorporated herein by reference.

Claims 5-7, 10 and 11 variously depend from claim 4; and claims 13 and 15 variously depend from claim 8, and, therefore, claims 5-7, 10, 11, 13 and 15 contain all of the features of the claims from which they depend. Thus, the deficiencies of Coron with respect to claims 4 and 8 are applicable to claims 5-7, 10, 11, 13 and 15.

Tu and Endo are merely applied by the Office Action as allegedly addressing additional features recited in dependent claims 5-7, 10, 11, 13 and 15 and, thus, Tu and Endo are not applied to cure the deficiencies of Coron with respect to claims 1, 4 and 8. For example, Tu and Endo are silent as to a bolometric device or detection method comprising a sensitive element having a spinel ferrite structure, as recited in claims 1, 4 and 8.

Further, the applied references and the Office Action fail to provide any reason or rationale for one of ordinary skill in the art to have modified Coron, Tu or Endo to have included each and every feature of claims 1, 4 and 8 without benefit of Applicants' specification. Variation of a material's resistivity with temperature is a well known material behavior (see specification, p. 10, lines 34-36) and, thus, one of ordinary skill in the art would not have been required to look to Coron in order to have ascertained existence of such a behavior. Therefore, by asserting that Coron discloses that conductivity increases with temperature, the Office Action has done no more than assert that Coron discloses principles of semi-conductive properties of materials (Office Action, pages 2-3). However, neither the Office Action nor the applied references provide a reason or rationale for one of ordinary skill in the art to have modified the sensitive material of Coron to comprise a spinel ferrite structure, as recited in claims 1, 4 and 8.

Although the variation of a material's resistivity with temperature is a necessary precursor for its use as a sensitive material, it is a wholly insufficient characteristic or feature

to designate a material as a sensitive material, within the purview of ordinary skill. More specifically, the applied references fail to disclose properties of ferrites and iron oxides as they relate to: (1) generation of electric noise; (2) material sensitivity; (3) ability to be integrated into a specific device or structure by microelectronic methods while maintaining its basic properties; (4) ability to retain flatness after integration onto a microbridge; (5) ability to be deposited into a thin film; (6) behavior with respect to various chemical and heat treatments; (7) compatibility with bolometer structures and read-out circuitry; (8) thermal coefficient of resistance; and (9) l/f noise, all of which are key characteristics for identifying sensitive materials for use in a bolometer device (see specification, page 2, lines 9-21; page 12, lines 17-30; page 13, lines 26-35; page 15, lines 6-8; and page 16, line 1). The Office Action fails to provide any benefit or desirability for one of ordinary skill in the art to have chosen a sensitive material having a spinel ferrite structure, as recited in the independent claims.

Accordingly, the applied references, alone or in combination, would not have rendered claims 4 and 8 obvious. Claims 5-7, 10, 11, 13 and 15 variously depend from claims 4 and 8 and, thus, also would not have been rendered obvious by the applied references, for at least the reasons set forth above.

Accordingly, reconsideration and withdrawal of the rejections are respectfully requested.

III. <u>New Claim</u>

By this Amendment, new claim 17 is presented. New claim 17 depends from claim 4 and, thus, distinguishes over the applied references for at least the reasons discussed above with respect to claim 4, as well as for the additional features it recites for the reasons that follow.

First, Coron fails to disclose and, likewise, fails to anticipate a sensitive layer thickness in the range of 10 nm to 500 nm, as recited in new claim 17. Instead, the only thickness that Coron discloses is found in Example 2 where Coron discloses thickness of an iron oxide deposit layer being 20 μm, which: (1) is not directed to a sensitive layer, as recited in claim 17; and (2) is orders of magnitude greater than the range of 10 nm to 500 nm recited in claim 17 (*see* Coron, page 2; Example 2).

Second, the physical and chemical properties of a spinel ferrite sensitive layer, based on its small thickness and crystalline size, significantly differ from layers of the same material that are employed in the form of a mono-crystal or massive form, as disclosed in Example 2 of Coron. This is due in part to the high surface to volume ratio in a thin layer, and because of the small crystalline size (*see* specification, page 10, lines 20-26). As a result, the applied references fail to provide reason or rationale for one of ordinary skill in the art to have chosen a sensitive material having a spinel ferrite structure, as recited in the independent claims, for the reasons discussed above, and a sensitive material layer having a thickness range recited in claim 17.

Prompt examination and allowance of new claim 17 are respectfully requested.

IV. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the claims are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

William P. Berridge
Registration No. 30,024

Sarah Lhymn
Registration No. 65,041

WPB:SQL/scg

Attachments:
Petition for Extension of Time
Request for Continued Examination

Date: December 7, 2009

OLIFF & BERRIDGE, PLC
P.O. Box 320850
Alexandria, Virginia 22320-4850
Telephone: (703) 836-6400

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